P3-052 NT: Surgery: RFA Etc. Posters, Wed, Sept 5 – Thur, Sept 6

How to evaluation of the completeness of cryotherapy in an attempt to quantify initial treatment success

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Background: Immediate evaluation is possible for the percutaneous CT-guided cryosurgery by estimation of Hounsfield units, the size of formed ice-ball, and the percentage of tumor area covered by ice-ball. But, this method is not useful for the patient underwent fluoroscopy-guided or video-assisted thoracosopic cryosurgery. And, the majority of the lesions are turned into cavitary lesion or necrotic area in the early postoperative periods. So, the aim of this study is to identify the methods and ideal time for the evaluation of the completeness of cryotherapy in an attempt to quantify initial treatment success.

Methods: 52 pulmonary tumors in 34 consecutive patients (29 men and 5 women, median age 63 years, age range; 25-80 years) were treated by cryosurgery. Of the 52 pulmonary masses, 29 masses were primary lung cancers, and 23 masses were metastatic lung cancers. Cryosurgery was performed under computed tomographic, fluoroscopic or video-assisted thoracoscopic guidance. Cryoablation was performed as one or two cycles of 20-minute freeze followed by 5-minute thaw. Follow up chest CT scanning was taken at postoperative 1 month, 3 months and 6 months. We measured the area and Hounsfield units of the mass with computed tomography. And we compare the measured value respectively.

Results: The measured area of the mass is ranged from 141.8mm^2 to 3996.8mm^2 preoperatively (postoperative 1 month; 66.8-8481.8mm^2, 3 months; 32.6-4841.7mm^2, 6 months; 45.6-4572.2mm^2). The Hounsfield unit is ranged from 32 to 98 preoperatively (postoperative 1 month; 8-71, 3 months; 24-68, 6 months; 26-98). And, the decrease of the Hounsfield unit of 1 month showed good correlation of the reduction of the area of mass at postoperative 6 months (p-value=0.14). On the contrary, between the change of the Hounsfield unit and the change of the area of mass at 3 months or 6 months showed no correlation statistically.

Conclusion: Postoperative computed tomographic scanning with measurement of Hounsfield unit at postoperative 1 month may be useful for the evaluation of the completeness of cryotherapy in an attempt to quantify initial treatment success.

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Factors affecting the local curability of cryoablation for malignant pulmonary tumors

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Background: Cryoablation for lung tumors is minimally invasive with median hospital stay of 2.6 days after treatment. However, local recurrences have occurred in 30% of treated tumors. In the present study, we analyzed the potential factors affecting local recurrence.

Materials and Methods: 173 tumors in 63 patients were followed up for more than 6 months after cryoablation. In these patients, 3 indices were examined. The diameter of tumors, distance between tumor and vessels 3 mm or larger, and the extent of the high density area (HDA) appearing after treatment which covers the tumor. Follow-up CT scan was taken every 3 months after treatment. Accumulated local control rate (LCR) was calculated by Kaplan Meier's method.

Results: 173 tumors included 12 primary lung cancer and 161 metastatic tumors with median diameter of 16.1mm. LCR 1 year after treatment (1 year LCR) was 92% in 57 tumors of 10 mm or less in diameter, 71% in 87 tumors of 11-20 mm, and 63% in 14 of 21-30 mm. 6 months LCR in 15 tumors of 30 mm or more in diameter was 47%. 1 year LCR in 106 tumors of 20 mm or less diameter devoid of large vessels within 4 mm from the margin of the tumor was 88% and that in 35 tumor of 20 mm or less with large vessels within 4 mm was 39%, significantly lower (p<.0001). Among 140 tumors of 20 mm or less diameter with measurable HDA on CT scan after treatment, 120 with HDA covering whole tumor showed 83% of 1 year LCR and 20 with insufficient HDA coverage showed significantly lower LCR of 32% (p<.0001). Significant correlation between the distance from large vessels and sufficient HDA was shown (Fisher's test; p=.014).

Conclusion: Tumor diameter over 31mm, 4 mm or nearer to large vessels (3 mm or more diameter), and insufficient high density area (not covering whole tumor) were poor prognostic factors for crypablation against malignant pulmonary tumors.

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Safety and efficacy of percutaneous cryosurgery under the ct guidance for the treatment of lung cancer

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Background: Many patients with lung cancer cannot undergo chemotherapy or radiation therapy due to impaired pulmonary function or poor general performance status. Most of them show resistance to these treatments, resulting in continued tumor growth and spreading. In such patients, minimally invasive treatments directed to local tumors may relieve patients from cancer pain or other generalized symptoms. As cryosurgery has been proven to be effective and also safe for cancers in prostate, kidneys, liver and endobronchial obstructive tumors, we sought to evaluate our results and safety of cryosurgery for lung cancer.

Methods: At our hospital, from October, 2004 to December, 2005, 28 patients were treated by cryosurgery. The average age of the patients was 59.8. Of the 28 patients, 18 had primary lung cancer, and 10 had metastatic lung cancers. The average tumor size was 49.9mm. Cryosurgery was performed using a cryoprobe under CT guidance using local anesthesia. Follow up chest CT scan was taken at post operative day on 1 week, 1mo, 3mo and 6 months, and surgical final outcome was evaluated according to RECIST (complete remission, partial remission, stable disease, and progression).

Results: There were no procedure related mortalities. Postoperative pleural effusion was noted in 1 case (3.5%) and there were 9 cases (32%) of pneumothorax of which 3 needed closed thoracostomies. Small amounts of blood tinged sputum was noted by 15 of the patients (53.6%). Of the 28 patients, 3 patients (10.7%) showed complete remission and six (21.4%) resulted in disease progression. 21 patients (75%) of the patients exhibited response to the cryosurgical procedure.

Conclusions: Cryosurgery for lung cancer can be performed safely under local anesthesia, and patients can be discharged early without se-

rious complications. The effectiveness in local tumor destruction makes cryosurgery a promising option for the treatment of local tumors in patients with impaired pulmonary function, poor general performances, or those who refuse to take surgery

P3-055 **NT: Surgery: RFA Etc. Posters, Wed, Sept 5 – Thur, Sept 6**

Fluorescence diagnostic and photodynamic therapy in patients with malignant pleural effusion

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Introduction: Malignant pleural effusion is a very common clinical manifestation of different neoplasms. Correct diagnosis in patients with malignant pleural effusion sometimes is difficult. Treatment of patients with primary (mesothelioma) and metastatic pleural spread is mostly palliative. The study was aimed to define diagnostic value of fluorescence thoracoscopy and photodynamic therapy in patients with malignant pleural effusions.

Materials and Methods: 41 patients with malignant pleural effusion were treated in our clinic using photodynamic therapy. Mesothelioma was diagnosed in 10, pleural metastases of different malignant tumors in 31 patients. Thoracoscopy was performed to 21 patients, thoracotomy - to 10 patients. Multifocal pleural biopsy was performed to confirm diagnoses histologicaly. Eight patients underwent thoracoscopic fluorescence diagnostic with 5-aminolaevulinic acid (5-ALA "Alasens"). In cases of diffuse malignant mesothelioma parietal pleuroectomy was routinely performed. Photodynamic therapy was done after debulking surgery and then continued after operation through diffusers (3-5) inserted into thoracic cavity. "Photosense" (0,3-0,5 mg/kg in 100 ml of isotonic natrium chloride solution) was used for photodynamic therapy intrapleuraly or intravenously. Five courses of prolonged photodynamic therapy were performed to each patient postoperatively.

Results: Pleural spread was confirmed by histologic examination in all patients. Additional pleural lesions, not visible by white light thoracoscopy, were found in 4 (50,0%) patients during fluorescence thoracoscopy and confirmed histologicaly in all cases. Photodynamic therapy considered to be effective: effusion accumulation decreased and then stopped in 39 (95,1%) of patients; pain relief - in 32 (78,1%). Two patients needed repeated chest tube drainage and courses of photodynamic therapy with positive results. Median follow-up was 14,3 months varies from 3 to 45 months. No recurrence of pleural effusion was detected during follow-up period.

Conclusion: Videothoracoscopy is an effective diagnostic method in definition of pleural effusion etiology; fluorescence thoracoscopy increases diagnostic abilities of standard thoracoscopy; photodynamic therapy of malignant pleural effusions permits to achieve good short-term results and improve quality of life in that complex group of patients.

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A novel strategy for the treatment of metastatic pulmonary tumors: Radiofrequency Ablation (RFA) in conjunction with surgery

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Introduction: Premeditated combination therapy with both surgical resection and radiofrequency ablation (RFA) has not been previously reported. We report our experience with combined CT-guided RFA and surgical resection in three patients with metastatic pulmonary tumors.

Patients and Methods: Percutaneous RFA was performed in patients with intrathoracic malignancies between June 2001 and April 2006 in Okayama University Hospital. A total of 229 patients underwent 389 RFA sessions applied for 637 lesions. Of the 229 patients considered, 188 patients who received RFA had metastatic pulmonary lesions, while 41 patients had primary lung carcinomas. There were 88 patients (38.4%) who had experiences of thoracic surgery before RFA. In this series, we experienced three cases which underwent combined therapy with surgical resection and RFA. Two cases of them had metastatic lesions on both sides of lungs, we performed surgical resection for one side and RFA for contralateral side due to avoid high-invasiveness by bilateral thoracotomy. We also experienced a case which underwent surgical resection on the part of a string of tumors and RFA on the part of solitary tumors to avoid high-invasiveness by right pneumonectomy.

Results: No pneumothoraces were seen for two patients after RFA, whereas the third patient was suffered from trifling pneumothorax needless to add any treatments. No other complications or side effects such as pleural effusion, pleurisy, relevant bleeding, high fever, or severe pain require medication occurred during and after RFA for all three patients. There were also no complications or side effects after surgery, and all patients could go back to their daily lives almost as same as theirs before these combined therapy.

The first patient remained asymptomatic on clinical examination about 9 months after the first RFA, however, contrast-enhanced CT scans revealed a right hilar lymph nodal swelling and re-growth with partial enhancement of the ablated tumor, a repeated RFA was performed in this same region. After the re-RFA, he has been receiving chemotherapy (CDDP + S-1), and he is alive with right hilar lymph nodes and pulmonary metastases about three and a half years after the combination therapy without any evidence of viability of ablated tumor.

In the second patient, follow-up CT scans obtained three months after RFA showed novel three metastatic tumors on both sides of the lungs without any signs of tumor progression. Therefore he underwent repeated RFA for these three tumors. CT scans obtained five months after the second RFA revealed some pleural dissemination in the right pleural cavity. He underwent embolization of the inferior phrenic arteries, and he is alive with tumors (disseminations) about a year and eight months after the combination therapy.

The third patient is alive and well without any signs of recurrence or metastases about nine months after the combination therapy.

Conclusions: By understanding the advantage and disadvantage of RFA and surgical resection, the combination therapy with these modali-